

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
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2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO (Name and Address)

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Westinghouse Electric Company, LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

Westinghouse Electric Company, LLC application
dated September 16, 2004, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: PATRIOT

(2) Description

A shipping container for unirradiated fuel assemblies. The package consists of a right rectangular metal inner container and a wooden outer container, with cushioning material between the inner and outer containers.

There are two versions of the metal inner container. Both versions measure approximately 11-1/4 inches high by 18-1/8 inches wide by 182 inches long. There are two channel sections within the inner container, and each channel section holds one BWR fuel assembly. The inner container is equipped with a lid and an end cap that are closed by 18 bolts and fastening lugs. The overall dimensions of the wooden outer container are approximately 30-1/4 inches wide by 31-1/4 inches high by 207-3/4 inches long. The cushioning material between the inner and outer containers is phenolic impregnated honeycomb and ethafoam. The inner container may be positioned on a series of vibration dampers mounted on the inside bottom of the wooden outer container.

The maximum weight of the package, including contents, is 2,988 pounds with the version #1 inner container and 2,964 pounds with the version #2 (optional) inner container.

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5.(a)(3) Drawings

The packaging is constructed and assembled in accordance with Westinghouse Electric Company, LLC Drawing Nos.:

10014E27, Rev. 1,
10014E28, Sheets 1 and 2, Rev. 2,
10015E58, Sheets 1 and 2, Rev. 2

5.(b) Contents

(1) Type and form of material

The package is designed to hold two unirradiated BWR fuel assemblies, comprised of UO_2 fuel rods in a 10 x 10 square array. The fuel cross-sectional area is 25 square inches.

(i) Description of Assembly Type #1

Each assembly is made up of 96 full-length fuel rods having a maximum active fuel length of 150 inches. The fuel pellet diameter is 0.819 ± 0.002 cm, encapsulated in 0.063 cm zirconium alloy cladding. There is a 0.0085 cm gap between the pellets and the cladding. The maximum U-235 enrichment of any fuel rod is 5.0 weight percent. Each assembly contains water holes in the four center rod positions of the assembly. Three different fuel package loadings have the following specifications:

- (A) Maximum average U-235 enrichment is 4.0 weight percent within any axial zone of the assembly; Maximum U-235 content is 3.25 weight percent of any gadolinia-urania rod or axial zone of any gadolinia-urania fuel rod; Maximum number of fuel rods per assembly containing 5.0 weight percent U-235 enriched pellets is 36; Maximum U-235 enrichment is 4.0 weight percent for all edge rods, and 3.5 weight percent for all corner rods; Each assembly must include at least eight fuel rods with a minimum gadolinia content of 2.5 weight percent in all axial regions with enriched pellets. The eight gadolinia rods are arranged with two rods in each quadrant of the fuel assembly. The two gadolinia rods within each quadrant must be symmetric about the geometric diagonal of the fuel assembly, and must not be in an edge or corner rod location. Other fuel rods containing gadolinia may be present.
- (B) Maximum average U-235 enrichment is 4.725 weight percent within any axial zone of the assembly; Maximum U-235 content is 4.2 weight percent of any gadolinia-urania rod or axial zone of any gadolinia-urania fuel rod; Maximum number of fuel rods per assembly containing 5.0 weight percent U-235 enriched pellets is 52; Maximum U-235 enrichment is 4.5 weight percent for all edge rods, and 4.0 weight percent for all corner rods; Each assembly must include at least eight fuel rods with a minimum gadolinia content of 5.3 weight percent in all axial regions with enriched pellets. The eight gadolinia rods are arranged with two rods in each quadrant of the fuel assembly. The two gadolinia rods within each quadrant must be symmetric about the geometric diagonal of the fuel assembly, and must not be in an edge or corner rod location. Other fuel rods containing gadolinia may be present.

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5.(b) Contents (continued)

- (C) Maximum average U-235 enrichment is 4.858 weight percent within any axial zone of the assembly; Maximum U-235 content is 4.2 weight percent of any gadolinia-urania rod or axial zone of any gadolinia-urania fuel rod; Maximum number of fuel rods per assembly containing 5.0 weight percent U-235 enriched pellets is 80; Maximum U-235 enrichment is 4.0 weight percent for all corner rods; Each assembly must include at least twelve fuel rods with a minimum gadolinia content of 2.4 weight percent in all axial regions with enriched pellets. The twelve gadolinia rods are arranged with three rods in each quadrant of the fuel assembly. The three gadolinia rods within each quadrant must be symmetric about the geometric diagonal of the fuel assembly, and must not be in an edge or corner rod location. Other fuel rods containing gadolinia may be present.

(ii) Description of Assembly Type #2

Each assembly is made up of 96 fuel rods having a maximum active fuel length of 150 inches. Each assembly contains four one-third length fuel rods and eight two-thirds length fuel rods. The four one-third length fuel rods are located on the outside corners of the assembly. The eight two-thirds length fuel rods, arranged as two rods in each quadrant of the assembly, are located symmetric to the geometric diagonal, toward the center of the assembly. The fuel pellet diameter is 0.848 cm nominal, encapsulated in 0.061 cm nominal zirconium alloy cladding. There is a 0.0075 cm gap between the pellets and the cladding. The maximum U-235 enrichment of any fuel rod is 5.0 weight percent. Each assembly contains water holes in the four center rod positions of the assembly. The fuel assembly must be transported in channels. The specifications for each one-third length axial section of the fuel assembly are as follows:

- (A) Upper section must contain 84 fuel rods, arranged as 21 rods per quadrant. Maximum U-235 enrichment of any rod is 5.0 weight percent. This section of the assembly must include at least eight fuel rods with a minimum gadolinia content of 4.0 weight percent in all axial regions with enriched pellets. The eight gadolinia rods are arranged with two rods in each quadrant of the fuel assembly, arranged symmetrically along the geometric diagonal of the assembly, and must not be in an edge or corner rod location. The section must contain 12 water holes, arranged as three water holes in each quadrant of the assembly. One of the three water holes within each quadrant must be located on the outside corner location of the assembly, and the other two water holes must be located on the geometric diagonal of the fuel assembly. Other fuel rods containing gadolinia may be present.
- (B) Middle section must contain 92 fuel rods, arranged as 23 rods per quadrant. Maximum U-235 enrichment of any rod is 5.0 weight percent. This section of the assembly must include at least ten fuel rods with a minimum gadolinia content of 4.0 weight percent in all axial regions with enriched pellets. The ten gadolinia rods must be arranged symmetrically along the geometric diagonal of the assembly, and must not be in an edge or corner rod location. The section must contain four water holes, arranged as one water hole in each quadrant of the assembly. Each water hole within each quadrant must be located on the outside corner location of the assembly. Other fuel rods containing gadolinia may be present.
- (C) Lower section must contain 96 fuel rods, arranged as 24 rods per quadrant. Maximum U-235 enrichment of any rod is 5.0 weight percent. This section of the assembly must include at least twelve fuel rods with a minimum gadolinia content of 4.0 weight percent in all axial regions with enriched pellets. The twelve gadolinia rods must be arranged symmetrically along the geometric diagonal of the assembly, and must not be in an edge or corner rod location. Other fuel rods containing gadolinia may be present.

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5.(b)(2) Maximum quantity of material per package

Two fuel assemblies. The total weight of contents not to exceed 1,320 pounds.

5.(c) Criticality Safety Index: 1.0

6. Each fuel assembly must be unsheathed or must be enclosed in an unsealed, polyethylene sheath which may not extend beyond the ends of the fuel assembly. The ends of the sheath may not be folded or taped in any manner that would prevent the flow of liquids into, or out of, the sheathed fuel assembly.
7. For the contents described in 5.(b)(1)(i), polyethylene inserts may be positioned between rods within the fuel assemblies. The quantity of polyethylene must not exceed 18.33 g polyethylene per centimeter length of the fuel assembly, and must not exceed a total of 6.99 kg per fuel assembly. The polyethylene may be borated. No polyethylene inserts may be used for the contents described in 5.(b)(1)(ii).
8. In addition to the requirements of Subpart G of 10 CFR Part 71:
 - (a) The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application.
 - (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.
9. For packagings fabricated in accordance with Drawing No. 10015E58, Rev. 1 (referred to as version #2 inner containers), only Serial Nos. 001 through 039, inclusive, are authorized for use.
10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
11. Revision No. 4 of this certificate may be used until August 31, 2007. Revision No. 3 of this certificate may be used until January 31, 2007.
12. Expiration date: August 31, 2010.

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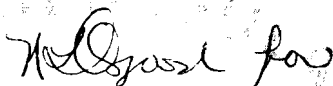
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REFERENCES

Westinghouse Electric Company, LLC consolidated application dated: September 16, 2004.

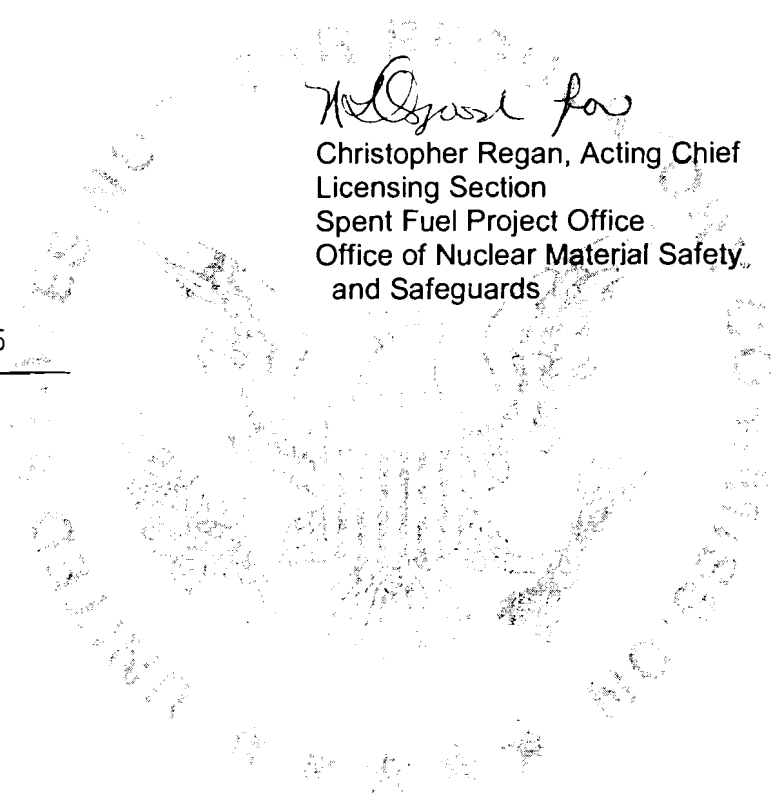
Supplements dated: April 14, June 14, August 9, and September 22, 2005; January 6, and May 13, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Christopher Regan, Acting Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: August 10, 2006





**UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001**

SAFETY EVALUATION REPORT

**Docket No. 71-9292
Model No. PATRIOT Package
Certificate of Compliance No. 9292
Revision No. 5**

SUMMARY

By application dated May 13, 2006, Westinghouse Electric Company, LLC, submitted an amendment request for Certificate of Compliance (CoC) No. 9292 for the Model No. PATRIOT package. Specifically, Westinghouse submitted revised packaging drawings to include additional configurations, and a revised authorized contents description in the CoC.

The amendment request included the necessary analyses and proposed CoC and application page changes to support the amendment request. The new application page changes will be referenced in the CoC as supplement dated May 13, 2006.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the amendment request, including the proposed CoC and application revisions, and other supporting documents submitted with the request. Based on the statements and representations in the application, as supplemented, the staff concludes that the Model No. PATRIOT package, as amended, meets the requirements of 10 CFR Part 71.

1.0 GENERAL INFORMATION

The applicant requested to revise Condition 5(a)(3) of the CoC, "Drawings," to include revised packaging drawings. The new packaging drawings incorporate changes made to the package configuration in Revision No. 4 of the CoC. The new drawings also include the use of a screen barrier in the inner container lid to prevent foreign material or debris from contact with the fuel assemblies. The applicant also requested to clarify the language of the description of Fuel Assembly Type #2, in Condition 5(b)(1)(ii) of the certificate. The specific changes made to the CoC are discussed below, in the "Conditions" section of this Safety Evaluation Report (SER).

1.1 Drawings

The applicant provided revised engineering Drawing No. 10014E28, Sheets 1 and 2, Rev. 2, and Drawing No. 10015E58, Sheets 1 and 2, Rev. 2. The revised drawings include the optional inner container configurations made during maintenance and refurbishment activities, which were approved under Revision 4 of the certificate. Also, the revised drawings include a packaging configuration that includes the addition of a screen barrier to the inner container lid to prevent foreign material or debris from contact with the fuel assemblies. The staff has reviewed the revised drawings and concludes that the proposed changes to these do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

6.0 CRITICALITY

The applicant requested a clarification of Condition 5(b)(1)(ii) of the certificate, which describes Assembly Type #2. Specifically, the CoC describes the location of the two-third length rods as located on the geometric diagonal of the assembly towards the center of the assembly. However, the actual location of these rods is symmetric to the geometric diagonal towards the center of the assembly. The applicant requested a revision of this description to reflect the actual location.

The applicant also modified the packaging drawings to include the use of a screen in the inner container lid to prevent foreign material or debris from contact with the fuel assemblies. The applicant stated that the screen does not restrict the free flow of water through the holes in the inner container lid.

The staff reviewed the criticality safety analyses in the PATRIOT package application and determined that the analyses correctly modeled the location of the two-third length rods in the fuel assembly as symmetric to the diagonal towards the center of the assembly. Therefore, the requested language change does not require changes to the criticality safety analyses in the PATRIOT application. The staff also reviewed the criticality safety analyses to examine the flooding configurations evaluated for PATRIOT package arrays under hypothetical accident conditions. The staff found that the applicant evaluated the most reactive package configuration under partial flooding, in which the space of the inner container lid was modeled as void space, while the inner container cavity was flooded with water. The applicant demonstrated that under these partial flooding configurations, the package array remains subcritical. Therefore, the staff concludes that accidental blockage of the inner container lid screen surface is properly bounded by the criticality safety analyses of the PATRIOT package application.

Based on these conclusions, the staff agrees that the proposed changes to Condition 5(b)(1)(ii) of the CoC, and to the packaging drawings of the PATRIOT package, do not affect the ability of the package to meet the criticality safety requirements of 10 CFR Part 71.

CONDITIONS

The following conditions in CoC No. 9292, Revision No. 5, have been revised as follows:

Condition No. 5(a)(3) was revised to reference the new engineering drawings describing the possible package configurations resulting from maintenance and refurbishment activities.

Condition No. 5(b)(1)(ii), "Description of Assembly Type #2" was revised to clarify the location of the two-third length rods in the fuel assembly.

Condition No. 11 was revised to authorize the use of the previous revision of the certificate for a period of approximately one year.

CONCLUSIONS

Based upon the staff's review, the statements and representations in the application, as supplemented, for the reasons stated in this Safety Evaluation Report, and with the conditions listed above, we conclude that these changes will not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9292, Revision No. 5,
on August 10, 2006.